THE ENERGY OBSERVER

Energy Efficiency Information for the Facility Manager

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Air Filters

The Energy Observer summarizes published material about proven energy technologies and practices, and encourages users to exchange experiences with generic energy products and services. This quarterly bulletin also identifies informational sources and energy training for facility managers and staff. ***The Energy Observer*** is a service of the **Energy Office, Michigan Department of Consumer & Industry Services.**

Filters are an important part of providing clean air to a building and maintaining the rated energy efficiencies of HVAC equipment.

Filter Basics

The primary use of filters is to remove particles and debris from the air. Higher quality filters can reduce or eliminate allergens and odors in the air such as mold, formaldehyde, bacteria, pollen, pet dander and dust mites.

Several residential and commercial filter medias and systems are available. Items to consider when selecting a filter include resistance and efficiency. Pressure drop indicates the amount of resistance, as measured in inches of water, necessary to pull the air through the filter. Filter Efficiency is based on the percentage of a specific particle size the filter media or system will remove. Efficiencies discussed in this article originated from testing and rating based on the ASHRAE Standard 52-76.

Particle Size Examples:

Description	Microns
Smoke	0.01-0.5
Bacteria	0.2-20
Pollens	10-400
Raindrops	500-5000

Filter Types

Filters used in commercial HVAC systems are commonly found in the following types; throwaway, pleated and bag type, electronic, HEPA and activated carbon.

Throwaway filters - These filters are designed to capture large dust particles and keep the fans and motors clean. Most throwaway filters are only effective for particles that are 10 microns or larger. High efficiency filters are generally 65% efficient and more effective on particles that are between 5 and 10 microns in size. High efficiency filters have higher initial resistance .16" H_2O and can climb as high as .3" H_2O when dirty.

Bag and Pleated Air Filters – These filters, like the throwaway filters, are available in different levels of efficiencies. Using this type of air filter increases the surface area that the air is allowed to flow through, therefore reducing the resistance to the airflow and greater efficiency.

Electronic Air Filters – There are two main types of electronic filters; electrostatic precipitators and charged media filters. In electrostatic precipitators, particles are collected on a series of charged plates. In charged media filter devices, which are less common, the particles are collected on the charged fibers of the filter. In most electrostatic precipitators and some charged-media filters, the particles are deliberately ionized (charged) before the collection process, resulting in higher collection efficiency. Electronic filters must be cleaned frequently and can lose their effectiveness over time.

HEPA Filters and Filter Systems – HEPA filter media are the only filters that have to meet a certain rated efficiency to be called a HEPA. They must be able to collect 99.97% of particles .3 microns in size and generally are 95% to 98% efficient on particles less than .3 microns in size. These filters have high resistance and cannot be placed directly in-line in a heating/cooling system.

Activated Carbon - This type of filtration is commonly used in homes and businesses for removing odors and some gaseous pollutants. These filters are constantly being tested and improved to provide more filtration.

MAINTENANCE

Filters must be changed regularly to maintain their rated efficiency. As filters become dirty, the airflow resistance through the filters increases causing more strain on the entire HVAC system. Over time, dirty filters can cause enough strain on the system to effect the energy efficiency and the lifetime expectancy of the HVAC equipment.

Regular maintenance of HVAC systems will reduce the risk of Sick Building Syndrome (SBS) or Building-related illness (BRI). Also eliminating excessive moisture will reduce the risk of mold growth in the system. The following are general maintenance guidelines.

- Change intake filters at least every month.
- Change make-up air filters at least every three months.
- Clean registers at least weekly
- Clean the evaporator coils and condensate pans using a hot water pressure wash and disinfectant at least every six months: Verify that both primary and secondary condensate drain lines are free of blockage
- Check roof sealants around ductwork and repair annually or when a roof leak develops
- Inspect all chilled water circulating lines and temperature mixer valves for leaking, condensation and/or mold during monthly site inspections

"If it doesn't fit it doesn't filter" To eliminate leakage around the filter - be sure to use only the correct size filters.

FOR MORE INFORMATION:

The Environmental Protection Agency (EPA) has a program specifically geared toward indoor air quality in schools. Information about this program and tools they provide can be found at: http://www.epa.gov/iaq/schools/index.html The EPA has also compiled a summary of available information on residential air cleaning devices. While the information is primarily residential, the information can be applied to commercial situations as well. http://www.epa.gov/iaq/pubs/residair.html

The US DOE Office of Energy Efficiency and Renewable Energy published an article in the Online Home Energy Magazine about air filters. http://hem.dis.anl.gov/eehem//96/960709.html

Visit the Energy Office website for information on current programs, services, past issues of ***the Energy Observer*** and grant information. Currently our website is being migrated to a new statewide format. However, all information from our former site is still available. The new URL is www.michigan.gov/energyoffice

If you have experience or data that you would like to share on this topic or if there is a topic that you would like to see discussed in a future issue of ***The Energy Observer,*** please contact Brandy Chapman (contact information below)

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